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ABSTRACT

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Use of Cattell's Three-Panel Model to Remedy Problems in Small Group Research

by

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Abstract

Small group research presently suffers from five major weaknesses: lack of a common conceptual base, lack of appropriate design, lack of external validity, lack of adequate instrumentation, and lack of appropriate statistical procedure. Application of Cattell's three panel model (involving syntality, characteristics of internal structure, and population traits) of group phenomena is suggested as a way to begin remediation of these weaknesses. Content validity of Cattell's paradigm is established. Efforts leading toward construct validity are described.

Small group research suffers from many methodological weaknesses (Cooper & Mangham, 1971; Gibb, 1971). The purpose of this paper is (1) to note specific weaknesses characterizing small group research, and (2) to propose suggestions for their solution.

Five major weaknesses have been identified:

(1) Small group research, theoretical or empirical, has no common conceptual base (Gazda, 1973; Palisi & Ruzicka, 1974/75). Diverse orientation have rendered the conclusions of process and outcome studies understandable only in isolation. What is lacking is the ability to compare meaningfully these results and theories across orientational boundaries.

(2) Small group research designs, in the main, have been descriptive and taxonomic studies, many of them superficial and poorly executed (Gibb, 1971). We contend that the time has come to step forward to experimental and quasi-experimental designs (Campbell & Stanley, 1963) without at the same time slipping into the quagmire of lack of proper controls (Bednar & Lawlis, 1971).

We also recommend the elimination of studies based on univariate design. Such studies are hopelessly ineffective in the field of small group where possible variables are so numerous. Hypothesis formation and testing by the laws of univariate experimentation grossly distort group phenomena. We see multivariate designs as the only acceptable route.

(3) External validity, to satisfy professional responsibility, has been lacking in small group research. Methodology and results have not

been very generalizable to situations where immediate feedback and evaluation are demanded, for example, in workshop or in-service situations. Data organization appears to be the culprit. A common practice for investigators is to add together data from many groups. This satisfies population requirements for the statistics, but the practice raises another problem to be discussed later.

(4) Instrumentation in small group research has been inadequate. Loosely tied to theoretical foundations, themselves often suspect, instruments are of questionable validity and lack controls for social desirability effects (Wahrman, 1974).

(5) Small group research has also been hampered by the lack of appropriate statistical analyses (Gazda & Peters, 1973; Miller & Kunce, 1973). Univariate statistics, popularly employed, are unacceptable for the same reasons univariate designs are unacceptable. Such method and procedures distort group reality by examining one variable in depth without regard for how it interacts with all the others.

Multivariate analyses must be undertaken. But multivariate analysis requires a larger number of subjects than have membership in the small group. To add together data from several groups, as many studies have done, in order to satisfy the number of subjects required, is, in our opinion, a violation of the essence of the small group. From having done such adding, the literature is now replete with studies of groups which never existed as analyzed. These deceptive methodological artifacts have led to a false sense of progress in the field (Gibb, 1971). Investigators have overlooked the point (Campbell & Erlebacher, 1975)

that collecting masses of data does not assure one of accurate answers to important questions.

Thus, we have a dilemma. Multivariate statistics, demanded by the nature of group interaction, require larger numbers of subjects than are provided by the small group. To add together data from several small groups destroys the essence of those groups.

To review, the problems with research in small groups present themselves as:

(1) lack of a common conceptual base;

(2) lack of appropriate design;

(3) lack of external validity;

(4) lack of adequate instrumentation;

(5) lack of appropriate statistical procedure.

We do have suggestions to remedy these obstacles. However, our proposed solutions are intertwined with the construct of Cattell's three panel model of group phenomena. Therefore, we would like to interrupt here and present this construct in more detail.

Cattell (1948) defined group in three, interdependent panels: (1) syntality, (2) characteristics of internal structure, and (3) population traits. We would like to elaborate on each of these panels.

Syntality refers to the group acting as a group, that is as a single entity. Traits in this first panel, inferred from members' behavior, are the group analogue to individual personality traits. Stated another way, syntality is a compound, not a mixture, derived from the behavior and feelings of individual members interacting with one another. The compound is attributed to members in a way to suggest the behavior and

feelings are those of a single entity, a unity called the group. Viewed from this perspective, syntality begins to fit the Gestalt principle that the whole is greater than the sum of its parts. Examples of group syntality are such constructs as group productivity, cohesiveness, aggressiveness.

Characteristics of internal structure, the second panel into which group variables may be organized, are the processes of action between members of a group. This panel includes two aspects: (1) the relationships among members, such as attraction-repulsion networks, and the consequent patterns of interaction, and (2) patterns of organization, including norms and formalized roles, and the consequent systems of interaction. Examples of characteristics of internal structure are democratic leadership style, norms of hard work, and pairing.

The third panel, population traits, is comprised of the characteristics of the individual members who compose the group. Such personal characteristics exist independently of the group and are typically brought to it when the individual becomes a member. Examples of population traits are age, sex, race, color of eyes and one's philosophy of human nature.

We would like to identify two types of population traits: stable and malleable. This typology is dependent upon the specific intervention demonstrated or hypothesized to be influential in change of the traits. Therefore, the distinction between stable and malleable traits is intrinsically dependent upon the efficacy of an intervention. An example is one's philosophy of human nature. Research (Wrightsman, 1974) indicates that philosophy of human nature is stable in relation to classroom

instruction once an individual reaches adolescence. Research (Wrightsman, 1974) further notes, however, that a dramatic event--if it contains implications regarding the nature of man--may make malleable long held beliefs.

In sum, population traits define the member of the group as he also is apart from the group. Whether his traits are stable or malleable depends upon their ability to be altered by a specific intervention.

The value of Cattell's three panel construct as well as our classification of population traits lies in the fact that they reduce a bewilderingly complex phenomena such as group interaction to its simplest, yet all inclusive form. Previous paradigms have failed to provide a comprehensive understanding of the complexities of a person's interaction with the environment. The three panel system remedies this and provides a reality-oriented model on which any empirical or theoretical study of group can be based.

Content validity for Cattell's theory is established and available (Cattell, 1951). Seeing the construct's value, we have both proposed (Palisi, 1972) and applied (Palisi & Ruzicka, 1974/75) it to structure small group theory. We are now to the stage of testing it experimentally for construct validity.

These efforts toward construct validity are well under way. We have been in the process of compiling a data bank from instruments administered to small group (both t-groups and problem solving groups) at our university. To date, we have data on 65 groups.

Variables on which data were chosen to be gathered were picked on the bases of (1) major empirical studies in the field (Bebout, 1971;

Lieberman, Yalom & Miles, 1973) indicating such variables are appropriate as barometers of group process and phenomena; (2) appropriateness of variable for measuring dimensions of the three panels.

We have spent time on this validity effort and value the Cattell paradigm because, as mentioned earlier, we feel that the weaknesses of small group research can be alleviated by the application of this model of group phenomena.

(1) To remedy the small group field's lack of a common conceptual base for its research, and its consequent use of expediency to motivate and order measurement of group (Cattell, 1951), we recommend the mooring of Cattell's atheoretical, transorientation paradigm. This will give the common base so sorely needed by which to speak in the same language about different studies and theories. Although other conceptual bases for group are available (cf., DeLamater, 1974), we have not yet found another so complete and inclusive of group phenomena as Cattell's.

(2) Cattell's three panel system serves extremely well as a base for multivariate designs in group research. By accounting for all phenomena possible, this model makes tractable the complex dynamics of small groups, forcing consideration of all variables in an interrelated and interacting network.

One can implement all possible and desired controls for experimental research with Cattell as the conceptual base. Testing of any theory of group is possible upon this foundation.

(3) External validity of group studies is increased by the use of Cattell's system. The fact that this paradigm can encompass all possible

variables interacting in a group enables investigators to begin to build an easily replicable method for practitioners in the field to measure these phenomena.

(4) By tightly focusing group phenomena by means of the three panel system, instrumentation can be refined to precise dimensions. Appropriate psychometric procedures can then be initiated.

(5) Our statistical dilemma in small group research remains even when we apply Cattell's three panel paradigm (or any other system) as a conceptual base for the research. By way of review of the problem, multivariate statistics are demanded for accurate representation of the reality of group phenomena. But the small t-group or problem solving group of approximately ten to fifteen members does not yield enough subjects for the number of variables required by the analysis.

When using the three panel construct as a conceptual base, the problem is not relieved. One needs many more than one or two variables under consideration when studying interaction of phenomena in the three panels. Otherwise, the three panels dwindle to just one panel, or just one aspect of two panels. To study just one or two aspects of the same and/or different panels distorts group interaction in a manner similar to the way univariate studies do.

We have already mentioned that we consider the summation of data from several small groups, to get the number of subjects required for multivariate analysis, to be a violation of the small group. We retain this conviction with the three panel system also. Such summing destroys the syntality of each group as well as the unique combination of population

traits and internal structure which contribute to it. Thereby, individual group components are lost.

In sum, the statistical dilemma of small group research remains despite the application of the three panel construct. We choose not to add together data from several groups to get a larger sample. We also choose not to use univariate statistics which require fewer subjects but result in distortions of group phenomena.

This problem rendered impotent our initial efforts to arrive at construct validity of the Cattell paradigm.

To resolve our dilemma, we organized data pertinent to a group into one aggregate score per variable. For example, we computed a mean or group range or group variance score for each variable being considered. This enables one, in a sense, to view each group as one subject. Interaction unique to each group is thereby preserved intact. This results in the theoretical integrity of the construct being validated also being protected. We will then enter data for each group, now represented in one score, into a statistical formula.

Statistical procedures that we plan to use, and with which we have run a pilot study, are the max hierarchical clustering algorithm or complete-link clustering (Sorenson, 1948; Johnson, 1967) and the multi-dimensional scaling solution (Shepard, 1962a, 1962b; Kruskal, 1964a, 1964b).

The complete-link method of clustering partitions all variables, beginning with the partition in which each variable forms a distinct subset and ending with the partition in which all variables are put

into one all-inclusive variable class. The sequence of the partitions is hierarchical in the sense that each partition is constructed by merging two subsets within the immediately previous subset, while leaving all other subsets intact. The term "complete-link) refers to the criterion of "goodness" used in determining which two subsets in a partition are to be joined to form the next partition in the hierarchy. All possible pairwise combinations of existing subsets (using the $\mathcal{T}$ statistic recommended by Goodman and Kruskal, 1954) of a partition are evaluated in terms of proximity values for pairs of objects that would be placed together if the two subsets were united.

A dendrogram generated by this analysis is illustrated in Figure 1.

Following Napior's (1972) recommendation, the cluster analysis is then embedded in a small space analysis (Guttman, 1968). As a means of selecting suitable dimensionality for representing data, one-, two, three-, and four-dimensional solutions can be computed, with each allowed to proceed through the number of iterations deemed appropriate by the Guttman-Lingoes coefficients of alienation.

An example of the map generated by the three-dimensional solution is shown in Figure 2.

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Figure 1

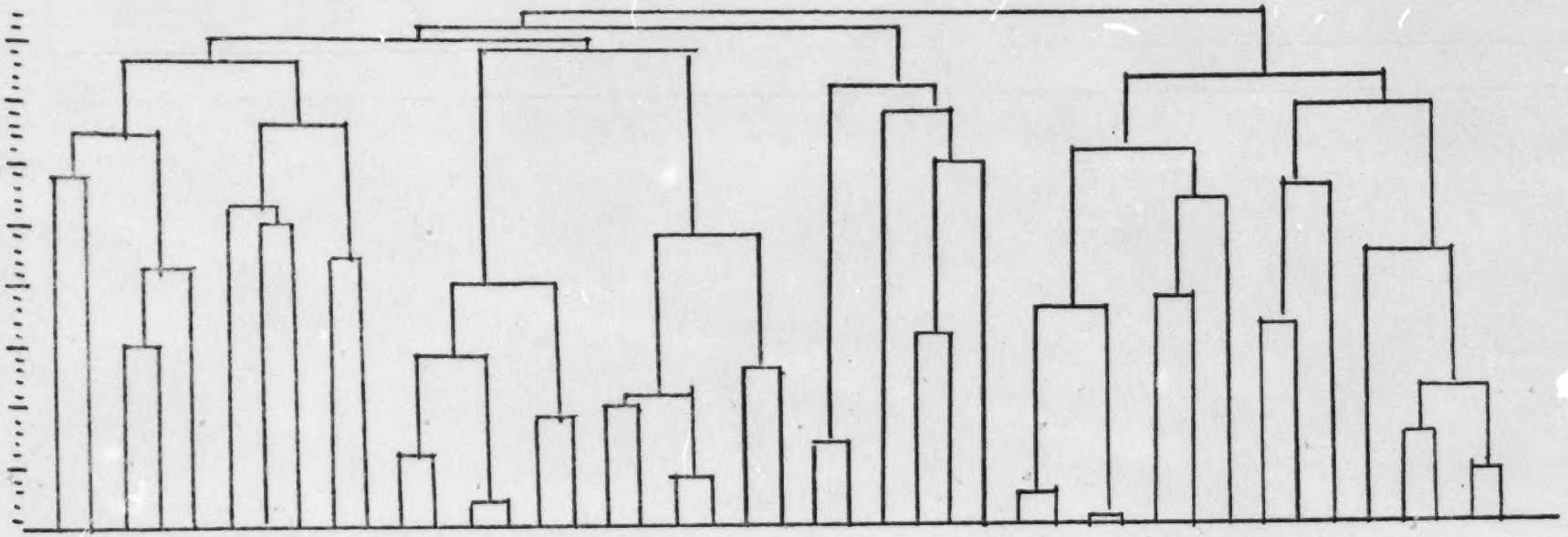
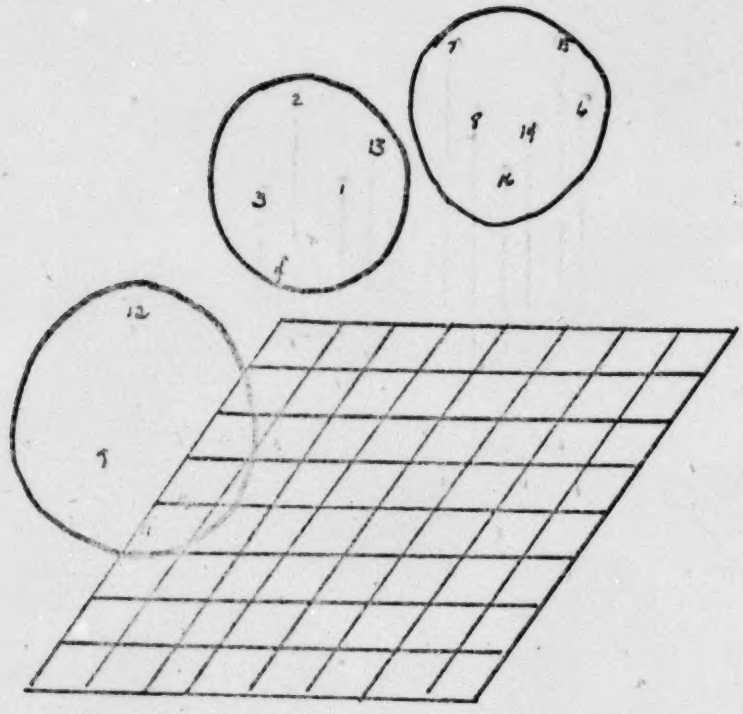


Figure 2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